Patent claims

1. A method for determining the frequency response of an electrooptical component (60) within a predefined frequency band, in which

- optical pulses having a first optical carrier frequency and having a predefined pulse frequency (fp) are generated,
- the electrooptical component (60) is driven with an electrical measurement signal (Smeas) having a predefined measurement frequency (fmeas) in such a way that an optical output signal (Sout) - modulated with the measurement frequency (fmeas) - having a predefined second optical carrier frequency is formed, the measurement frequency (fmeas) being an integral multiple of the pulse frequency (fp) plus a predefined frequency offset (Δf),
- the pulses and the output signal (Sout) are subjected to a joint frequency mixing and, from the mixed products formed during the frequency mixing, at least one mixed product (M'') is detected whose modulation frequency corresponds to the predefined frequency offset (Δf),
- the frequency behavior of the electrooptical component (60) at the measurement frequency (fmeas) is determined on the basis of the intensity, in particular the power, the amplitude or the root-mean-square value, of the detected mixed product (M''), and
- the frequency behavior of the electrooptical component (60) is determined in the manner described for all measurement frequencies (fmeas) which correspond to an integral multiple of the pulse frequency (fp) plus the predefined frequency offset (Δf) and which lie within the predefined frequency band.

2. The method as claimed in claim 1, characterized in that, from the mixed products, exclusively those mixed products (M'') are detected which have the summation frequency formed from the first and second optical carrier frequencies as optical carrier frequency.

3. The method as claimed in claim 1, characterized in that, from the mixed products, exclusively those mixed products are detected which have the difference frequency formed from the first and second optical carrier frequencies as optical carrier frequency.

4. The method as claimed in one of the preceding claims, characterized in that the predefined frequency offset (Δf) has a positive or a negative magnitude.

5. The method as claimed in one of the preceding claims, characterized in that the spectral line strengths of the optical pulses are determined beforehand and they are taken into account when determining the frequency behavior of the electrooptical component (60).

6. The method as claimed in claim 5, characterized in that when determining the frequency behavior of the electrooptical component (60), from the spectral line strengths of the optical pulses that have been determined beforehand, the spectral line strength of in each case that spectral line whose spectral line frequency corresponds to the difference frequency between the respective measurement frequency (fmeas) and the predefined frequency offset (Δf) is taken into account.

7. The method as claimed in one of the preceding claims, characterized in that the spectral line strengths determined beforehand are determined by means of the spectral power of the spectral lines of the optical pulses being determined beforehand, in particular by means of an autocorrelator.

8. The method as claimed in claim 6 or 7, characterized in that, for the purpose of determining the frequency behavior of the electrooptical component (60), a mixed product intensity value (Im*Dm) specifying the intensity of the selected mixed product (M'') is divided by a spectral line value (Im) - specifying the spectral line strength of the spectral line of the optical pulses which is associated with the selected mixed product (M'') - with formation of a frequency response value (Dm) of the electrooptical component (60).

9. The method as claimed in one of the preceding claims, characterized in that a nonlinear element (40) through which the optical pulses and the optical output signal (Sout) are radiated is used for the purpose of forming the optical mixed products (M).

10. The method as claimed in one of the preceding claims 1 to 8, characterized in that a 2-photon detector is used for the purpose of forming and/or detecting the optical mixed products.

11. The method as claimed in one of the preceding claims 1 to 8, characterized in that an optical rectifier, in particular a nonlinear crystal, is used for the purpose of forming and/or detecting the optical mixed products.

12. The method as claimed in one of the preceding claims, characterized in that the measurement frequency is calculated in accordance with the following determination equation:

$$fmeas = m * fp + \Delta f$$

where fmeas denotes the measurement frequency, Δf denotes the frequency offset and fp denotes the pulse frequency.

13. The method as claimed in one of the preceding claims, characterized in that the predefined frequency offset (Δf) is predefined in a variable fashion.

14. The method as claimed in one of the preceding claims, characterized in that the frequency response of an electrooptical component (60) formed from a light source (61) and a downstream electrooptical modulator (62) is determined.

15. The method as claimed in one of the preceding claims, characterized in that the frequency response of an optoelectrical transducer (400) is simultaneously determined within the predefined frequency band by

- radiating the optical output signal (Sout) generated by the electrooptical component (60) into the optoelectrical transducer (400),
- measuring an electrical transducer signal (S2) generated by the optoelectrical transducer (400) with formation of a transducer measured value, and
- using the transducer measured value and the measured frequency response of the electrooptical component (60) to determine the frequency response of the optoelectrical transducer (400).

16. The method as claimed in claim 15, characterized in that the frequency response of the optoelectrical transducer (400) is determined by dividing the transducer measured value by a frequency response value (Dm) of the electrooptical component (60).

17. The method as claimed in one of the preceding claims, characterized in that the pulse frequency (fp) of the optical pulses is generated by means of a first high-frequency source, in particular a pulse generator (10), and the measurement signal (Smeas) is generated by means of a second high-frequency source, in particular a sine-wave generator (70), the two

high-frequency sources (10, 70) being coupled, in particular coupled in phase-locked fashion.

18. The method as claimed in one of the preceding claims, characterized in that the phase response of the electrooptical component (60) is additionally measured.

19. The method as claimed in claim 18, characterized in that

- a phase signal (PL1) is generated which specifies the phase angle ($\Delta\Phi1$) between the drive signal (SA) of a pulsed laser (20) generating the optical pulses and the electrical measurement signal,
- the phase angle between the generated phase signal (PL1) and the phase angle of the detected mixed product (M'') is measured for each of the measurement frequencies (fmeas) in each case with formation of a phase measured value ($\Delta\Phi2$).

20. The method as claimed in either of the preceding claims 18 and 19, characterized in that the phase response of the optoelectrical transducer (400) is additionally measured.

21. An arrangement having a pulsed laser (20), an electrooptical component (60) and a measuring device (100) having an evaluation device (120), which is suitable for carrying out a method as claimed in one of the preceding claims.